Claims

We claim:

1. A light-emitting device, comprising:

an active region configured to generate light in response to injected charge; and

a current confinement structure located to direct charge into the active region and including a strain compensating layer adjacent an oxide-forming layer.

2. The light-emitting device of claim 1, in which the current confinement structure comprises an additional strain compensating layer adjacent the oxide-forming layer, where the oxide-forming layer is sandwiched between the strain compensating layers.

3. The light-emitting device of claim 1, in which the strain compensating layer comprises gallium, indium and phosphorus.

4. The light-emitting device of claim 1, in which the oxide-forming layer comprises aluminum, gallium and arsenic.

5. The light-emitting device of claim 1, in which the strain compensating layer consists essentially of $Ga_{1-x}In_xP$, where $x \leq 0.5$.

6. The light-emitting device of claim 1, in which the oxide-forming layer consists essentially of $Al_xGa_{1-x}As$, where $x \geq 0.96$.

7. The light-emitting device of claim 1, in which:

the strain compensating layer consists essentially of gallium indium phosphide GaInP; and

the oxide-forming layer consists essentially of aluminum gallium arsenide AlGaAs.

8. The light-emitting device of claim 7, in which:

the strain compensating layer consists essentially of gallium indium phosphide $Ga_{1-x}In_xP$ in which $x \leq 0.5$; and

the oxide-forming layer essentially of aluminum gallium arsenide $Al_xGa_{1-x}As$ in which $x \geq 0.96$.

9. The light-emitting device of claim 1, structured to generate light having a wavelength between 620 nm and 1650 nm.

10. A method of making a strain compensating structure, the method comprising:

providing a substrate;

forming over the substrate a strain compensating layer of a first semiconductor material;

forming an oxide-forming layer of a second semiconductor material juxtaposed with the strain compensating layer to form the strain compensating structure; and

oxidizing at least part of the oxide-forming layer.

11. The method of claim 10, in which:

the first semiconductor material comprises indium, gallium and phosphorus; and

the second semiconductor material comprises aluminum, gallium and arsenide.

12. The method of claim 11, further comprising:
forming the strain compensating layer using $Ga_{1-x}In_xP$, where $x \leq 0.5$; and
forming the oxide layer using $Al_xGa_{1-x}As$, where $x \geq .96$.

13. A method for generating light, the method comprising:
forming an optical cavity;
locating an active region in the optical cavity, the active region configured to generate light in response to injected current;
forming a current confinement structure located to direct current into the active region, including:
forming a strain compensating layer of a first semiconductor material including gallium (Ga), indium (In) and phosphorus (P);
forming an oxide-forming layer of a second semiconductor material including aluminum (Al) gallium (Ga) and arsenic (As);
oxidizing at least part of the oxide-forming layer; and
injecting current into the active region using the current confinement structure.

14. The method of claim 13, in which the active region is configured to generate light having a wavelength between 620 nm and 1650 nm.

15. A strain compensating structure, comprising:
a strain compensating layer of a first semiconductor material including gallium (Ga), indium (In) and phosphorus (P); and
an oxide-forming layer of a second semiconductor material including aluminum (Al) gallium (Ga) and arsenic (As) juxtaposed with the strain compensating layer.

16. The strain compensating structure of claim 15, in which the first semiconductor material consists essentially of gallium indium phosphide $Ga_{1-x}In_xP$ in which $x \leq 0.5$.

17. The strain compensating structure of claim 15, in which the second semiconductor material consists essentially of aluminum gallium arsenide $Al_xGa_{1-x}As$ in which $x \geq 0.96$.

18. The strain compensating structure of claim 15, in which:

the first semiconductor material consists essentially of gallium indium phosphide (GaInP); and

the second semiconductor material consists essentially of aluminum gallium arsenide (AlGaAs).

19. The strain compensating structure of claim 18, in which:

the first semiconductor material consists essentially of gallium indium phosphide $Ga_{1-x}In_xP$ in which $x \leq 0.5$; and

the second semiconductor material essentially of aluminum gallium arsenide $Al_xGa_{1-x}As$ in which $x \geq 0.96$.